THE VELOCITY DEPENDENCE OF THE CROSS SECTION OF BORON FOR THE CAPTURE OF SLOW NEUTRONS

BY
EMMETH AUGUST LUEBKE
B.A., Ripon College, 1936
M.S., University of Illinois, 1938

AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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An intermittent source of slow neutrons from the Illinois linear accelerator is used to investigate the velocity distribution of slow neutrons escaping from paraffin. The velocity of the neutrons is observed directly by measuring their time of flight in traversing a known distance from source to detector. The times of arrival of neutrons at a distant detector are recorded, together with a signal from the source and an appropriate time scale, by photographing the screen of an oscilloscope. The variation of the absorption coefficient with neutron velocity is determined by comparing the velocity distribution obtained when an absorber of boron is placed in the beam, with that obtained without the absorber.

The data obtained show that the cross section of boron for the capture of slow neutrons varies inversely as the neutron velocity. A comparison of the velocity distribution of neutrons from a cube of paraffin 15 cm. on a side, with a Maxwellian, shows an excess of fast neutrons and a most probable velocity somewhat higher than one would expect for neutrons in thermal equilibrium at room temperature.

VITA

Emmeth August Luebke was born August 1, 1915 in Manitowoc County, Wisconsin. He received his elementary education in the public schools of Manitowoc, Wisconsin. He obtained the B.A. degree from Ripon College in 1936 and the M.S. degree from the University of Illinois in 1938. He has done graduate work in physics at the University of Illinois since 1936. From 1936 to 1940 he has been a teaching assistant on half-time. He was appointed to a University Fellowship during 1940-41. He was employed as a research physicist by the General Electric Company during the summer of 1939. He is affiliated with the Society of Sigma Xi and the American Physical Society.